

March 10, 1995

MEMORANDUM FOR THE RECORD

SUBJECT: INFORMATION PROCESSING DIVISION (IPD) CONFIGURATION CONTROL BOARD (CCB)  
MEETING TO CONDUCT THE LANDSAT 7 PROCESSING SYSTEM DESIGN/SOFTWARE  
REQUIREMENTS REVIEW

The IPD CCB convened at 8:30 a.m., March 9, 1995, in Building 3, Auditorium to conduct the subject review.

Enclosure 1 reflects pertinent aspects of the discussion that transpired. Enclosure 2 contains the action items that were assigned.

Members of the CCB were:

D. Giblin/Code 560, Chairman  
J. Jackson/Code 562  
E. Beard/Code 563  
C. Wilkinson/Code 564  
W. Kelly/Code 563, IPD Systems Engineer

Other Attendees were:

D. Sames/Code 563	C. Liu/CSC/GreenTec IV
J. Hosler/Code 563	T. Aslam/CSC/GreenTec IV
J. Henegar/Code 563	D. Alban/CSC/GreenTec IV
J. Schmidt/Code 564	H. Kim/CSC/GreenTec IV
J. Andary/Code 430	M. Harris/CSC/GreenTec IV*
D. Knapp/Code 501/430	C. Bauer/CSC/MOC*
F. Stone/Code 430	D. Via/CSC/MOC*
S. Jurizyk/Code 430	R. Kieckhefer/CSC/MOC
T. Ackerson/Code 505	D. Denzler/CSC/502
J. Rosenberg/Code 563*	D. Riggs/CSC/502
C. Taveras/Code 531	R. Rensvold/CSC/502
A. Caroglanian/Code 531	J. Fisher/CSC/GreenTec IV
L. Wentz/Code 510*	L. Gonzales/CSC/430
D. Martin/Code 430	T. Johnson/CSC/MOC*
S. Scott/Code 430	A. Hall/CSC/GreenTec IV
E. Lee/Code 564	S. Priest/CSC/GreenTec IV
T. Smith/Code 564	M. Huang/CSC/GreenTec IV
M. Dowdy/Code 563	R. Shea/CSC/GreenTec IV
K. Dolan/Code 430	B. Boyce/Loral/ GreenTec IV
K. Michael/Code 564	R. Forsht/MMAS/430
T. Grubb/Code 563	T. Keller/MMC/430
R. Calvo/Code 303	T. Arvidson/MMAS/430
O. Kardatzke/Code 563	R. Tassi/Loral/GreenTec IV*
C. Brambora/Code 564	D. Nguyen/Loral/GreenTec IV*
J. Martin/Code 502/430	N. Patel/NYMA
J. Irons/Code 923	R. Schweiss/Code 564
T. Cooke/ATSC/519.1	G. Komar/NASA HQ
J. Brophy/ATSC/531.2	B. Gambhir/SSAI
M. Bucko/ATSC/519.1	R. Heinemann/USGS/EDC
P. Province/ATSC	J. Boyd/USGS/EDC
R. Tingley/CSC/GreenTec IV*	R. Irish/SSAI/430
D. Specht/CSC/GreenTec IV	J. Donley/SWAS/430
S. Address/CSC/GreenTec IV	H. Wong/SWAS/430
J. Freeman/CSC/GreenTec IV	J. Unekis/USGS/EDC
B. O'Brien/Unisys/300.1	B. Hobart/Swales*

Prepared by:

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Philip E. Province/IPD  
CCB Administrator

Approved by:

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Dennis M. Giblin/IPD  
CCB Chairman

Distribution:  
CCB Members  
Other Attendees except\*

Enclosure 1 (1 of 8)

IPD CCB MEETING MARCH 9, 1995 TO CONDUCT THE  
SUBJECT REVIEW

Pertinent questions/answers and comments that transpired during the subject IPD CCB meeting are contained herein.

INTRODUCTION - J. Henegar/Code 563

1. Comment: The sub-interval definition is a problem. (G. Komar)
- Comment: This was defined for us as a Level 2 requirement. (J. Henegar)
- Comment: We are currently working on a sub-interval basis; we will resolve this issue later. (J. Andary)
2. Question: Is there a working group to resolve the I and Q channel issue? (D. Martin)
- Answer: Yes; LP DAAC is part of the group. (J. Henegar)

SYSTEM DESIGN: - R. Schweiss/Code 564

3. Question: For raw data capture hardware option 1, would you use simultaneous record and playback? (J. Boyd)
- Answer: It is a capability we would have but not necessarily exercise. (J. Henegar)
4. Question: Who will develop the custom board for option 6? (D. Martin)
- Answer: It is not that complex and it will be developed in-house by GSFC personnel. (R. Schweiss)
- Note: Hardware development will be performed by Code 564 not 563 as stated at the presentation. (R. Schweiss)
5. Question: What is the cost for adding BCH to option 6? (J. Boyd)
- Answer: BCH processing will be handled by software. (R. Schweiss)
- Comment: This cost was considered in the trade-off studies. (J. Henegar)
- Comment: The bottom line is that option 6 has the lowest projected lifecycle costs. (D. Giblin)
6. Comment: The BCH software is estimated to be about 1500 lines of code.

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- Comment: I am not concerned about the size of the BCH software, I am concerned about the risks when "dirty" data is received with the resulting software overhead for processing the data. (R. Forsht)
- Comment: The BCH prototype provided adequate performance results on data which contained 3 bit errors in every CADU. The BCH software implementation is feasible and the most cost effective approach. (J. Henegar)

7.    Question:           Is the interface with LP DAAC (FDDI/TBR) options still under discussion?  
      Answer:           Yes, both option 1 and 3 are being discussed.   (R. Schweiss)  
      Comment:          We would like to use a router so we could be independent of this interface.       (J. Henegar)
8.    Question:           Is the LPS and LP DAAC planning the same protocol?  
      Answer:           LPS is proposing TCP/IP.       (J. Henegar)  
      Question:          Is there a schedule for resolving the hardware and protocol issues?       (D. Martin)  
      Answer:           Yes, we coordinate with other groups as to when specific resolutions are required. This is being tracked at the working level.       (R. Schweiss)  
      Comment:          I am concerned that the back-end issues of hardware and protocol are still not resolved.       (D. Martin)  
      Comment:          We need this resolved by the end of April.   (J. Henegar)  
      Comment:          All the protocols will be handled by COTS software.   (R. Schweiss)
9.    Question:           What bit error rate requirements were assumed in the LPS system sizing analysis?  
      Answer:           We have a requirement to not degrade the data any further than 10 to the minus 5, but the worst case (3 bit errors in every CADU) is being sized.   (J. Henegar)
10.   Comment:           There was much discussion on the processor size of 806 MIPS but no issues were identified.

Note: Processor size of 806 is the estimated requirement for the LPS on a per string basis; 1200 MIPS is available.   (R. Schweiss)

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11.   Question:           Would the database have to be expanded if the data were held for more than 60 days?   (J. Jackson)  
      Answer:           Yes.       (R. Schweiss)
12.   Question:           How many controllers are you planning?   (R. Forsht)  
      Answer:           We are planning one per 32 GB.   (R. Schweiss)
13.   Question:           Have you prototyped your processors together?   (R. Forsht)  
      Answer:           We are in the process of doing that now.   (J. Henegar)
14.   Question:           What if the contact period is 16 minutes instead of 14 minutes; would this be a hardship?

Answer: Yes, 14 minutes is the maximum. (J. Henegar)

Comment: There is nothing in the LGS to prevent this from being changed.

Comment: We need to be sure we can work at the 0 angle. (J. Boyd)

Comment: We will check our assumption that 14 minutes will cover the 0 angle. (D. Giblin)

Note: See Action Item 03-09-95-01.

15. Question: How many hardware vendors can support the data rates required?

Answer: There are multiple vendors that can support the rates. We selected the one with the best price and performance. (C. Brambora)

Question: SGI had a problem a year ago; has that been corrected? (R. Forsht)

Answer: Yes. (C. Brambora)

16. Comment: We would like a statement from the vendor that the hardware will continue to be supported during the planned life of the Landsat 7 mission. (J. Unekis)

Comment: This is normally hard to obtain. We will attempt to get statements from the vendors. (R. Schweiss)

Note: See Action Item 03-09-95-02.

Enclosure 1 (4 of 8)

17. Comment: I would like to see alternate vendors identified for RAID hardware. (J. Boyd)

Note: See Action Item 03-09-95-03.

18. Question: Will BCH decoding be performed on all data packets?

Answer: Yes. (J. Henegar)

19. Question: I am concerned about the impact of BCH calculations if the error rate is higher than 10 to the minus 5. Is there a point that this causes loss of data? (J. Unekis)

Answer: No, data would not be lost. (J. Henegar)

- Comment: The BCH processing can momentarily slow down the system. The rate could go as low as 1 Mbps. (T. Aslam)
- Comment: The throughput requirements can be met. The average is 4-5 Mbps for 3 bit errors per CADU. (J. Henegar)
- Comment: We will have plenty of time to catch up. (R. Schweiss)
20. Question: Did you do tradeoffs for using hardware instead of software for Level 0R processing? (J. Boyd)
- Answer: No. (R. Schweiss)

Note: See Action Item 03-09-95-04.

Note: It is my understanding that this question pertains to the PCD portion of the LEVEL 0R processing. (R. Schweiss)

- Comment: There is a format change for Landsat 7 so I don't know if this will be feasible. (C. Wilkinson)
21. Question: Has a decision been made to use Wavelet for browsing? (J. Boyd)
- Answer: Yes.
- Comment: This is compatible with the DAAC. (J. Unekis)
22. Question: What is the time requirement to bring up a string?
- Answer: Based on assumptions from RMA analysis, it is 55 minutes, but it can be done in less time.

Enclosure 1 (5 of 8)

- Comment: Then if there is a failure of a string during a contact, the remainder of the data for that contact would be lost. (D. Martin)
23. Question: Will string 5 be a hot backup?
- Answer: No, the 5th string is a standby. (R. Schweiss)
- Comment: This is not an engineering issue; it is an operations issue. (C. Wilkinson)
24. Comment: String 5 could be a hot backup during a contact and used for other processing during non-contact times.
- Comment: This is an issue for EDC to resolve.
- Comment: The real issue is can we record all the data. (J. Unekis)
25. Question: Can you switch the front-end or do you switch the entire string?

Answer: We switch the string. (R. Schweiss)

Comment: We don't need an entire string to capture data. (S. Jurczyk)

Note: In other words, a stripped down LPS could perform raw data capture. (R. Schweiss)

26. Comment: The fifth string can be used while another failed string is being repaired. (J. Unekis)

SOFTWARE SPECIFICATIONS - J. Hosler/Code 563 and D. Sames/Code 563

27. Comment: We need to look into options for redundant data capture in case of a string failure. (G. Komer)

Note: See Action Item 03-09-95-05.

28. Question: How many operators are being planned? (J. Jackson)  
Answer: One operator per shift. (D. Sames)

Comment: This should be no problem since we have operated with "lights out" in the past. (J. Unekis)

29. Question: Does LPS meet NASA AIS security requirements?  
Answer: We are using security provided by the DBMS and the OS. No additional security is being supplied. (R. Schweiss)

Enclosure 1 (6 of 8)

30. Question: Why is no long term or trend reporting provided?  
Answer: The LP DAAC has all this information in the metadata. LPS has no trending requirements. (J. Henegar)

Comment: A RID can be generated on this issue. (J. Andary)

Question: Would the trending be against the 60 day database? (J. Jackson)

Answer: Yes. (D. Sames)

31. Question: Why is the Metadata function included in the Management and Control Subsystem (MACS)?

Answer: This is where all the required information is residing. (J. Henegar)

32. Question: When there is a data loss and a scene is closed and starts up again in a different sub-interval, how is the scene put back together? (J. Boyd)

Answer: It uses a parameter to keep data with small losses in a single sub-interval and to start a new sub-interval when the parameter is exceeded. (T. Aslam)

Comment: We don't want a break unless there is a very large loss of data since we have the requirement to be able to "stitch" scenes together. (J. Boyd)

Comment: LPS does not have a requirement to stitch the scenes. (J. Henegar)

Question: Can you handle time jumps within an interval using fly-wheeling? (R. Forsht)

Answer: Yes. (J. Henegar)

33. Comment: There was discussion on the requirement to "Copy received wideband data to removable media concurrently with Level 0R processing of that data", but it was concluded that this is not an issue since this processing doesn't occur during data capture.

34. Question: Why is the "check and annotate changes in the VCID" not part of the CCSDS checking?

Answer: It is just checking for VCID changes.

Comment: This is significant because it indicates an I & Q flip, so it should be a part of the CCSDS checking.

Comment: This is our software requirements review so the order of the checking may be changed in the design. (J. Hosler)

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Comment: There was much discussion on this issue but no specific resolution.

35. Question: What is the percentage of reusable software for MFPS? (D. Denzler)

Answer: It may be as high as 15 percent.

36. Comment: During assembly of PCD minor frames, resolution is by majority. (J. Hosler)

Comment: A PCD is still processed through the system even if it fails BCH. (J. Henegar)

37. Question: During "calculate scene info", what does the accuracy of 1 kilometer mean? (T. Keller)

Answer: It is about a 90 percent number.

Comment: The accuracy should be better than 1 kilometer. (J. Henegar)

Comment: The accuracy is better for Landsat 7 than for the older missions.

38. Question: What is the format of the time differences between actual time of the ETM + major frame and the spacecraft time? (J. Boyd)



- Answer: It will be in milliseconds.
39. Question: Is data radiometrically balanced before browse and ACCA in the Image Data Processing Subsystem?  
Answer: We are looking at this issue to see how much additional work is required. (J. Hosler)
40. Question: Are you planning to reprocess any data that is more than 60 days old? (J. Jackson)  
Answer: No. (J. Hosler)
- Question: What happens after a software upgrade if reprocessing of old data is required for testing? (J. Jackson)  
Answer: We will have baseline tests. (J. Henegar)
- Comment: After much discussion it was concluded that data older than 60 days could be reprocessed.
41. Question: Is browsing only for format 1 data? (J. Boyd)  
Answer: Yes, for multiband data. (J. Henegar)

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42. Question: Is there a histogram with the browse data?  
Answer: No. (J. Hosler)
43. Question: Who has the responsibility for the Level 0 file format? (J. Boyd)  
Answer: LPS will be providing this in a data format description document. (J. Henegar)
44. Question: Which subsystems will have significant reuse software? (D. Denzler)  
Answer: The RDCS will be mostly reuse software, and LDTS will be mostly system software. (J. Hosler)
45. Question: How long is IPD responsible for maintenance support? (J. Jackson)  
Answer: We are responsible until the May 1998 launch date. (J. Henegar)
- Comment: Then there will be training required. (J. Jackson)
- Comment: We should do a RID to request more support. (J. Boyd)
- Comment: If additional support is required, NOAA should pay.
- Comment: That issue can be handled in the RID response. (D. Giblin)

46. Question: Have you considered lead time requirements for hardware procurements?

Answer: Yes, we have lead times scheduled. We are doing most purchases through SEWP.

Disposition: The Landsat 7 Processing System Design and Software Requirements were approved by the IPD CCB subject to the completion of the action items in Enclosure 2 and the resolution of all RIDs that are received.

Enclosure 2 (1 of 1)

LANDSAT ACTION ITEMS FROM THE MARCH 9, 1995  
IPD CCB MEETING

Number

03-09-95-01	Confirm that a 14 minutes contact period is the maximum possible for Landsat 7. (Requested by D. Giblin/560)	J. Henegar/ Code 563
03-09-95-02	Obtain statement from vendors that the hardware and operating systems will continue to be supported during the life of Landsat 7. Also demonstrate that the S/W can be executed on an alternate H/W system. (Requested by J. Unekis/USGS)	R. Schweiss/ Code 564
03-09-95-03	Identify alternate RAID hardware vendor for LPS hardware demonstrate both systems. (Requested by J. Boyd/USGS)	R. Schweiss/ Code 564
03-09-95-04	Investigate using hardware instead of software for CCSDS frames and data decommutation into band files in preparation for Level 0R processing. (Requested by J. Boyd/USGS)	R. Schweiss/ Code 564

03-09-95-05

Investigate using recorders similar  
to those used by S. Jurizyk/430 for  
data capture in case of string failure.  
(Requested by G. Komar/NASA HQ)

J. Henegar/  
Code 563